

SIDEWALL DENSITY GUARD SONDE

The sidewall-density guard probe uses multiple detectors to provide an accurate borehole-compensated density measurement with excellent bed-boundary resolution. The probe includes natural-gamma, caliper and a focussed LL3 guard-resistivity measurement with good vertical resolution and reasonable depth of investigation.

PRINCIPLE OF MEASUREMENT:

Density The probe contains a gamma source and two high-sensitivity scintillation gamma detectors. The detectors are shielded against direct radiation from the source or via the borehole by heavy-metal collimation. The windows of the source and detector are maintained firmly in contact with the borehole walls by a motorised back-up arm that also provides a borehole caliper measurement. Gamma radiation from the source is backscattered by the formation (Compton effect) and reaches the two detectors where the relative count-rates provide a measure of formation bulk density.

Resistivity The probe includes a central current-source electrode mounted between two guard electrodes, maintained at the same potential by internal electronics. The central electrode current is constrained to a thin disk by the presence of the guards and returns to the cable armour above a 10m insulated section. The potential of the central electrode and the measured current are combined by a down-hole microprocessor to calculate the apparent formation resistivity.

FEATURES

- Compensated density output directly in engineering units (g/cc)
- Separate short-spacing detector(s) for accurate bed-boundary location
- Tungsten shielding reduces borehole influence on measurement
- Collimated source minimises mud-cake effect
- Powerful motorised caliper arm maintains good sidewall contact
- Standard calibration blocks available for field or base use
- LL3 Focussed resistivity for good bed boundary resolution and depth of penetration

MEASUREMENTS

- Compensated density
- Natural gamma
- Caliper
- High-resolution density HRD
- Bed-resolution density BRD (option)
- Temperature (option)
- Focussed resistivity
- SP

APPLICATIONS

Minerals

- Lithology
- Density and porosity
- Correlation with other logs
- Bed thickness and boundary location
- Ash content in coal
- Indication of fractures and permeable zones
- Moisture determination in coal

Engineering

- Rock strength and elasticity parameters (with sonic log)
- Detection of weathered or fractured zones
- Ground compaction studies

Water

- Location of aquifer and aquitard
- Porosity measurement
- Detection of cavities and missing cement

OPERATING CONDITIONS

Borehole type: open-hole, water-filled
Qualitative measurements are possible in air-filled boreholes (excluding resistivity)

SPECIFICATIONS

Diameter:	50mm
Length:	2.75m
Weight:	27kg
Max. temperature:	70°C (extended range available)
Max. pressure:	20MPa (extended range available)
Density detectors:	NaI(Tl) scintillation crystal
Density spacings:	48cm (LSD) 24cm (HRD) 14 cm (BRD)
Calibrated density range (LSD):	1.2 to 2.95 g/cc
Natural-gamma Detector:	50mm x 25mm NaI (TI) scintillation crystal
Caliper range:	50mm to 300mm
Resistivity range:	0.2 - 10,000 ohm-m

SALES INFORMATION

Probe:

25 007 000	Sidewall density probe
25 008 000	-includes BRD
25 009 000	-includes BRD and temperature
25 011 000	Sidewall density guard probe
25 011 001	-includes BRD
25 011 002	-includes BRD and temperature

Accessories:

30 001 000	3.7GBq ¹³⁷ Cs gamma source
20 081 000	Aluminium block field check jig
20 070 000	Natural-gamma API calibrator without source
30 010 000	3.7MBq ¹³⁷ Cs source for natural-gamma calibrator

